



## *Endowment Risk Management*

*Managing risk holistically to create intergenerational equity*

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- Please see Appendix for additional information.

# Agenda

- I. Risk Management Fundamentals
- II. Endowment Risk Management | Managing Risk in the Real World
- III. Endowment Risk Management | Setting Risk Appetite
- IV. Summary

# Risk Management Fundamentals



## Risk Management Fundamentals | Defining Risk Culture

The old-school way of doing business hides problems and creates inefficiencies.

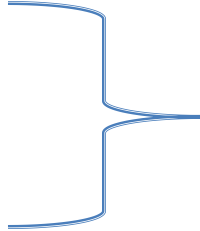
- ***Radical collaboration*** solves those problems.
  - It brings the best minds together,
    - exposes hidden risks,
  - and accelerates innovation and growth.

*Don Tapscott, author of “Wikinomics”*

## Risk Management Fundamentals| Some Basics

### *Banking Risk Management*

- Credit Risk
  - Will she pay?
- Market Risk
  - Will she win?
- Operational Risk
  - Will it work?
- Regulation
  - Will she play by the rules?



### *Investment Risk Management*

- Investment Risk
  - Market Risk + Credit Risk + Performance Analysis
  - What is my risk-adjusted return over time?
- Operational Risk
  - Asymmetrical Payout
- Regulation
  - Will she play by the rules?

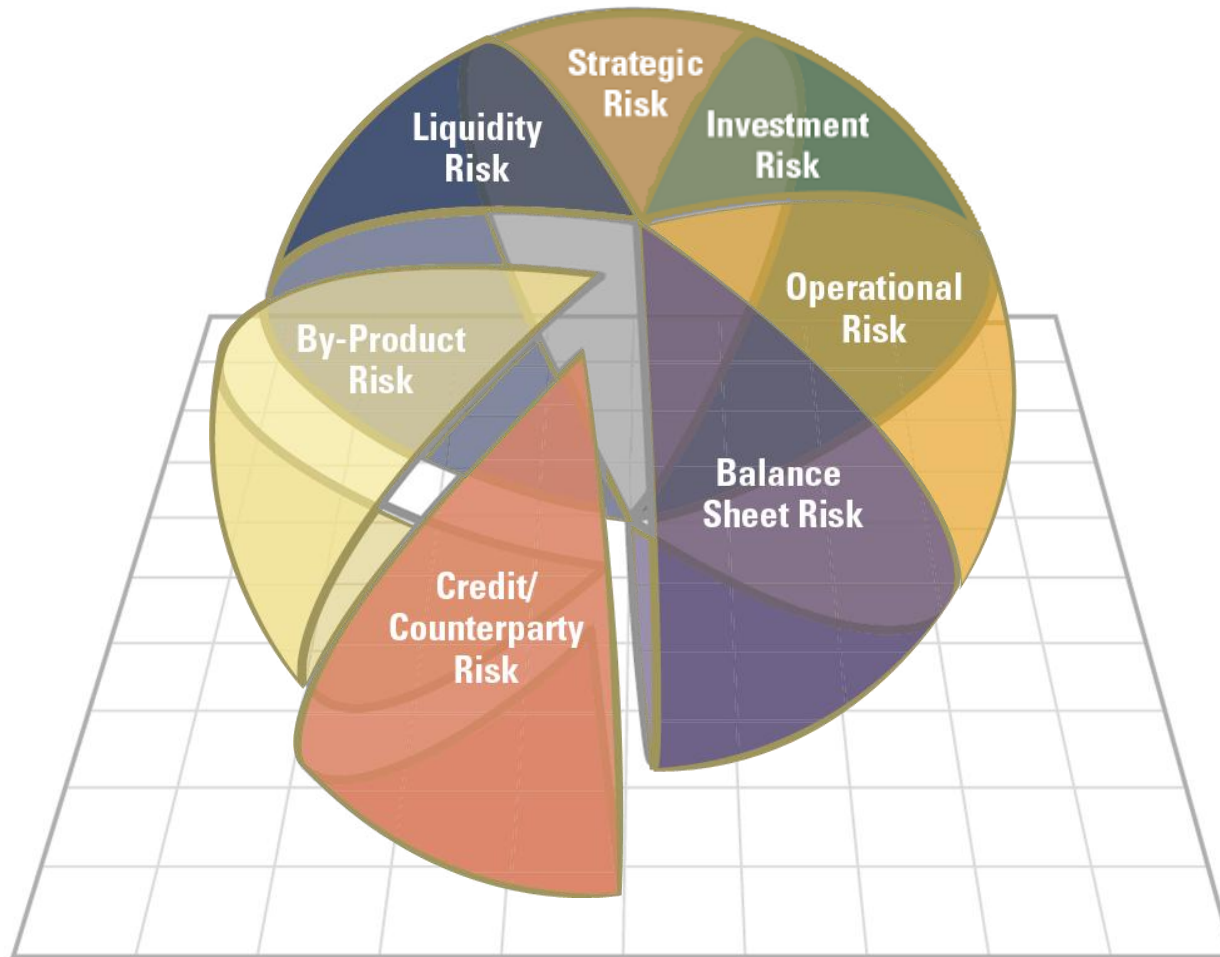


*Focus on Capital*

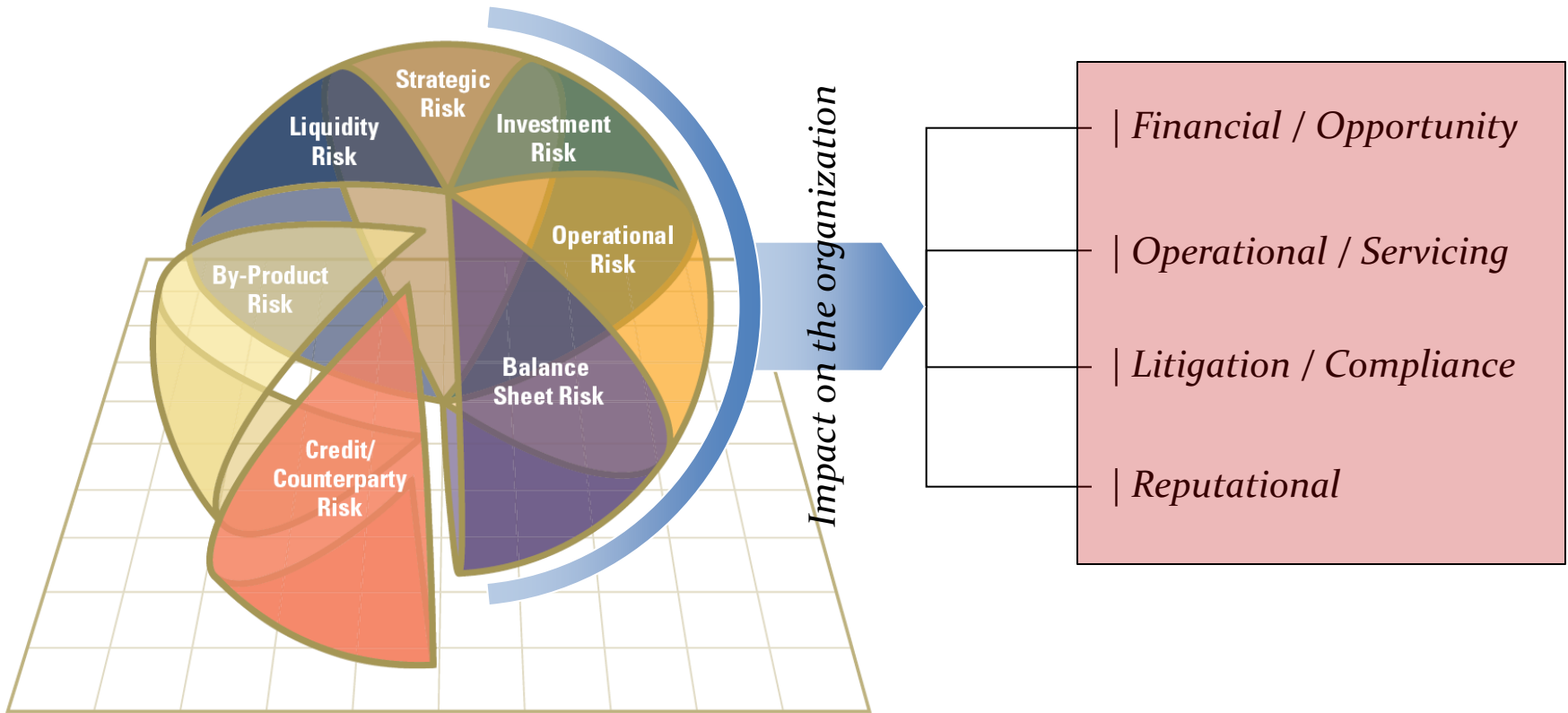


*Focus on Return on Capital*

## Risk Management Fundamentals | “Independent, 360° Perspective”



# Risk Management Fundamentals | Assessing Risk Holistically





# Risk Management Fundamentals | Focus on Your Client

## *Banking Risk Management*

- Shareholders
- Bank Employees
- Regulators

## *Investment Risk Management*

- Investors
- Firm Employees
- Regulators

## Risk Management Fundamentals | Culture & Execution

*Focus on Fulfilling your Fiduciary Responsibility*

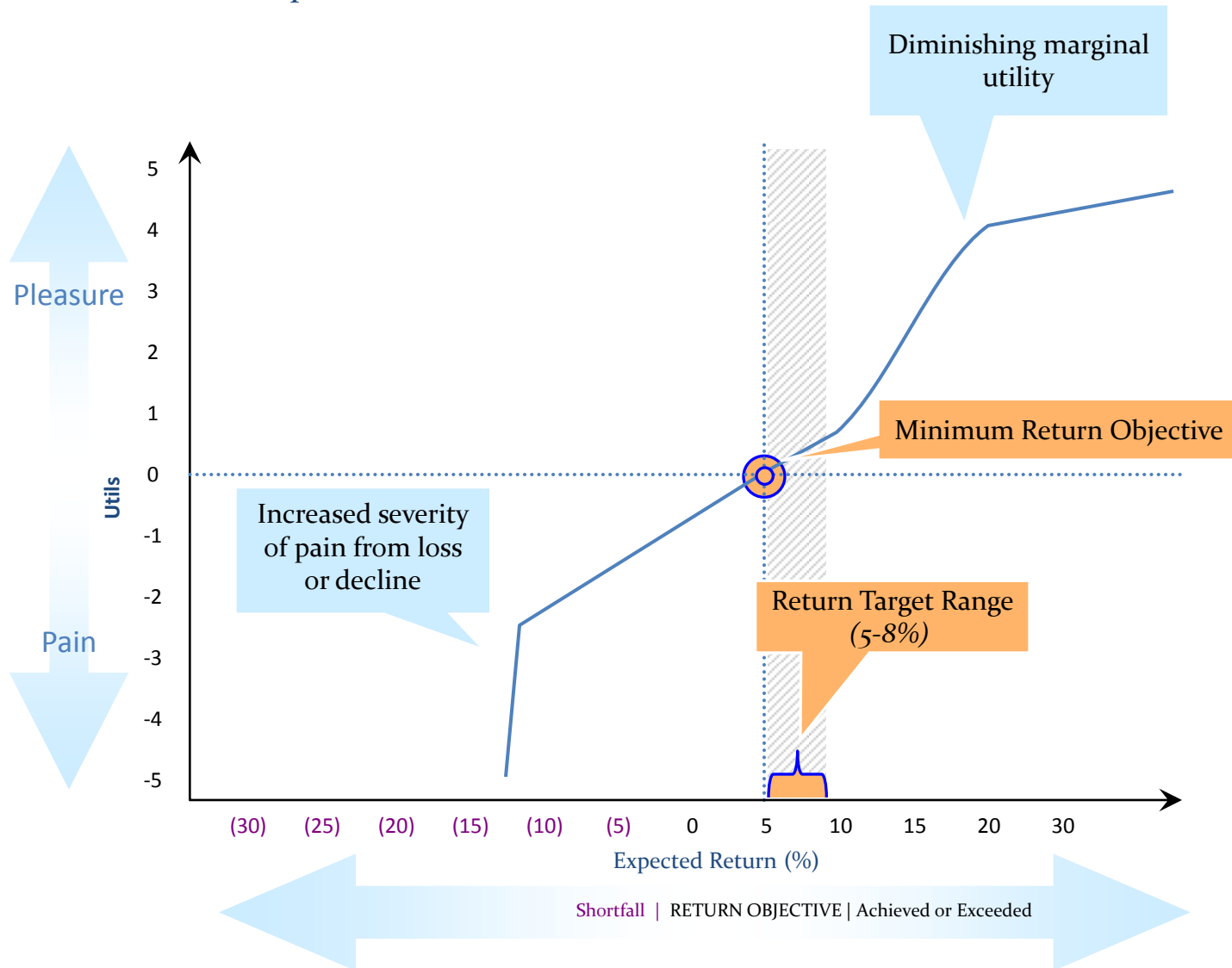
# Endowment Risk Management

## Managing Risk in the Real World



# Endowment Risk Management | Understanding Investors' Kinked Utility Function

## *Illustrative Example*



# Endowment Risk Management | Key Investment Philosophies

- Focus on the Aggregate Investment Portfolio
  - Point of View
  - Asset Allocation and Portfolio Construction are key to achieving success.
- Time Frame Arbitrage
  - Invest for the long-term
  - Remain dynamic
- Illiquidity Arbitrage
  - Accrue a premium for investing in inefficient, illiquid markets
- Portfolio diversification using alternative asset classes
  - Hedge Funds
  - Private Equity & Venture Capital
  - Distressed Debt
  - Natural Resources
- Objective: Create intergenerational equity over time
  - Real positive returns net of spending and inflation
    - Spending policy is key to achieving success.


## Endowment Risk Management | How Do We Define “Risk?”

- Failure to generate intergenerational equity over the long-term.
  - Generate net investment returns above spending and inflation over 10-20 years.
  - Focus on the aggregate investment portfolio.
- Unexpected impact of endowment liabilities and other non-investment cash flows on the investment portfolio.
- Failure to provide sufficient liquidity to accommodate expected commitments and requirements.
- Significant risk of relative underperformance of execution versus policy
- Unexpected volatility of performance, resulting in losses significantly in excess of expectations
- Absorbing any unexpected costs (e.g. risk byproduct) from investment-related activities
- Other risks:
  - Balance Sheet Risk
  - Operational Risk
  - Counterparty Risk
  - Legal/Regulatory Risk



# Endowment Risk Management | Evolving Portfolio Dynamics

## *Hypothetical Example*



Most	Risk Assets/ Growth	Inflation Hedges	Deflation Hedges	Diversification
	<ul style="list-style-type: none"> <li>Public equities (large)</li> <li>Public equities (small)</li> </ul>	<ul style="list-style-type: none"> <li>Commodities</li> <li>TIPs</li> </ul>	<ul style="list-style-type: none"> <li>Cash</li> <li>U.S. Treasuries</li> </ul>	<ul style="list-style-type: none"> <li>Commodities</li> <li>Fixed Income</li> <li>Currency (Non U.S. \$ investments)</li> </ul>
	<ul style="list-style-type: none"> <li>Long/short equities</li> <li>Activists funds</li> <li>Event funds</li> <li>Opportunistic credit</li> </ul>	<ul style="list-style-type: none"> <li>CTAs</li> </ul>	<ul style="list-style-type: none"> <li>Short equity bias funds</li> </ul>	<ul style="list-style-type: none"> <li>Trend following hedge funds</li> <li>Global Macro hedge fund strategies</li> <li>Relative value strategies</li> </ul>
	<ul style="list-style-type: none"> <li>Distressed Debt</li> </ul>			<ul style="list-style-type: none"> <li>Distressed debt</li> </ul>
	<ul style="list-style-type: none"> <li>Venture capital</li> <li>Private equity</li> <li>Opportunistic R/E</li> <li>Value Add R/E</li> </ul>	<ul style="list-style-type: none"> <li>Core Real Estate</li> <li>Natural Resources</li> <li>Infrastructure</li> </ul>		<ul style="list-style-type: none"> <li>Real Estate</li> <li>Natural resources</li> </ul>
Least				

Note: For illustrative purposes only. Asset classes and investment strategies listed are representative and not intended to be all inclusive.

Source: Aleksander Weiler, CFA for the Greenwich Roundtable.

# Managing Multiple Layers of Asset Allocation Risk

## ASSETS

Fixed Income (private/public).....

Equity (private/public).....

Absolute Return .....

Real Assets (private/public).....

## LIQUIDITY

Illiquid .....

Quarterly .....

Monthly .....

Daily .....

## CURRENCY

U.S. ....

Canada .....

Europe .....

Asia .....

## RISK FACTORS

Size .....

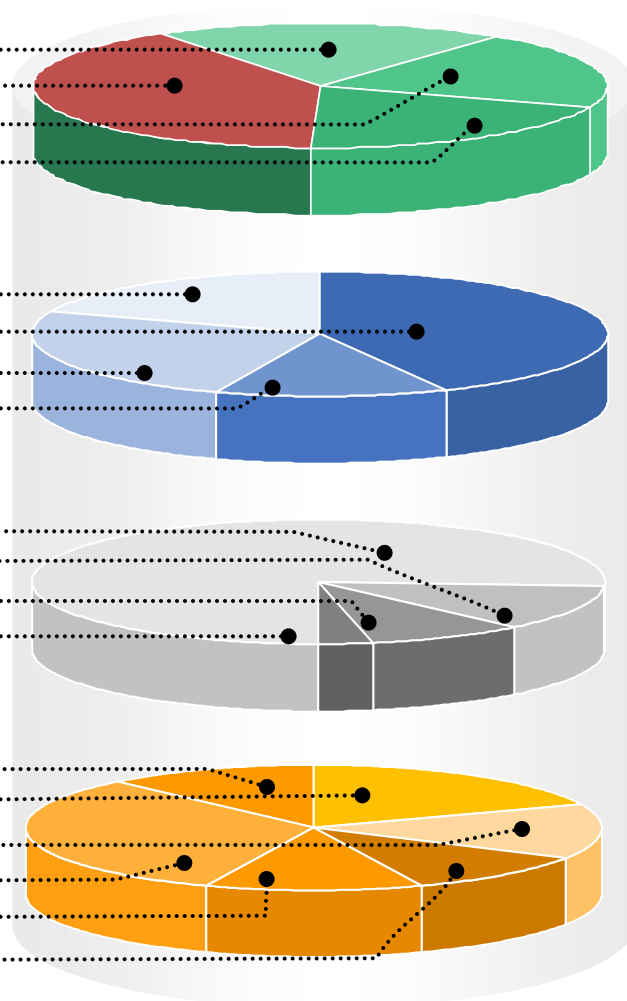
Style .....

Volatility /VaR/Stress .....

Inflation Hedge.....

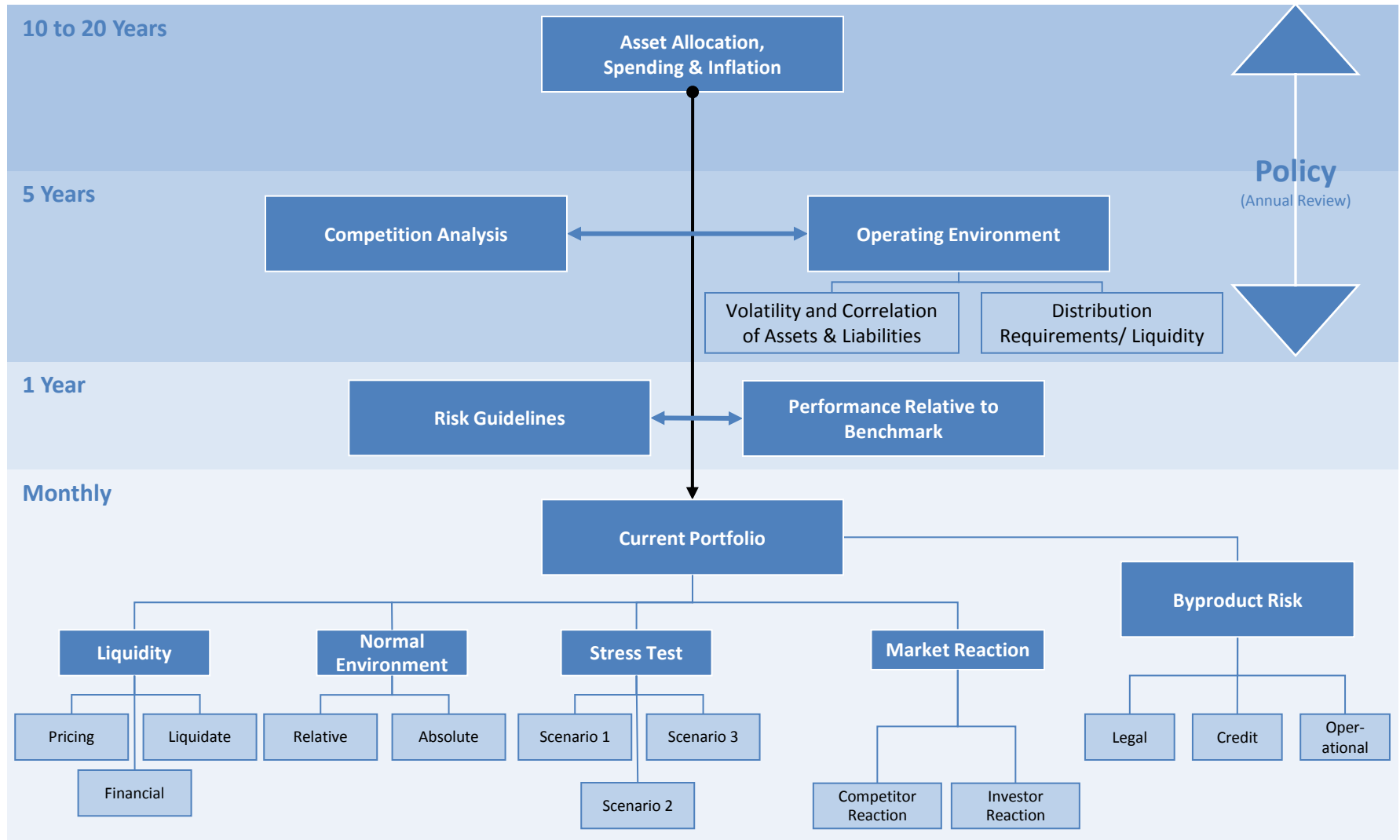
Beta .....

Diversifying .....





# Endowment Risk Management | Risk Waterfall



# Commonfund Allocation Planning Model™

•**APM is only a model.** The returns depicted by the APM are hypothetical and do not represent the actual returns earned by any investor or investment fund or product. The APM does not guarantee or assure any future investment results. Simulation data as of 12/31/2008.

•**What is the APM?** The APM is an analytic tool that can assist investors in thinking about the potential distribution of returns of various investment strategies.

•**What isn't the APM?** The APM should not be treated as a recommendation concerning any specific investment or asset class, or any mix thereof, or as a tool that can predict specific investment outcomes.

•**How does the APM work?** The APM takes today's yield curve, uses Monte Carlo simulation to project 1,000 different yield curves for next year by changing economic factors that affect the curve, and projects returns for each of 20 asset classes in each of the "new" yield curve environments. The projected returns are based on the regression of the historical relationship between these asset classes and the yield curve. The model then takes each of the 1,000 "new" yield curves as the next starting point and repeats the process, building another 1,000 yield curves, and projecting returns in those environments. The model runs these simulations for twenty years into the future.

•**The APM doesn't account for fees and expenses.** The return distributions calculated by the APM are based on historical data of the performance of specified market indexes. This data does not take into account the impact of investment fees and expenses. In the case of an actual investment portfolio, fees and expenses would reduce returns (to the extent that they exceeded any performance above the relevant index returns generated by active management strategies.)

•**The APM's output will vary.** The APM's output will vary with each use (based upon changes in input assumptions and in the historical performance data on which the APM output is based) and over time.

•**Investment Risks:** The investment asset classes depicted in the APM involve varying degrees of investment risk. Alternative assets in particular may involve reduced liquidity and risky investment strategies. Investors in any of these asset classes could lose some or all of their principal. In particular cases (including investments on margin, short selling and similar strategies), investors could lose more than their principal investment. See the explanatory notes at the end of this presentation.

•**Definitions and details:** Certain terms used in the following presentation (such as "intergenerational equity" and "real return environment"), together with complete details of the assumptions underlying the APM, are included in the explanatory notes at the end of this presentation

IMPORTANT: The projections or other information generated by the Allocation Planning Model™ regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results. Results may vary with each use and over time. See APM Explanatory Notes at the end of this presentation.

# Input Summary

	Policy	NCSE Peers* \$101-500 Million	Diverse (80/20)	Diverse (70/30)
Asset Summary				
Equity Strategies	60.0%	51.9%	65.0%	55.0%
Fixed Income Strategies	40.0%	24.0%	10.0%	10.0%
Directional/Relative Value Strategies	0.0%	17.8%	5.0%	15.0%
Real Assets	0.0%	6.3%	20.0%	20.0%
Equity/Fixed	60% / 40%	67% / 33%	80% / 20%	70% / 30%
Inflation / Deflation Hedging	0% / 5%	6.27% / 8.53%	20% / 1%	20% / 1%
Direct Non-\$ Exposure	0.00%	28.10%	23.00%	27.00%
Liquidity Mix				
Daily	100.0%	63.4%	53.0%	43.0%
Monthly	0.0%	7.5%	12.0%	12.0%
Quarterly	0.0%	10.7%	5.0%	5.0%
Annually	0.0%	7.1%	0.0%	10.0%
Illiquid	0.0%	11.2%	30.0%	30.0%
Spending Rule	Percent of Market Value	Percent of Market Value	Percent of Market Value	Percent of Market Value
Schedule	No additional Spending planned over 20 years	No additional Spending planned over 20 years	No additional Spending planned over 20 years	No additional Spending planned over 20 years
Contributions Rule	None	None	None	None
Schedule	No additional Contribution planned over 20 years	No additional Contribution planned over 20 years	No additional Contribution planned over 20 years	No additional Contribution planned over 20 years
20 Yr. Median				
Cumulative Spend	\$317.08M	\$350.50M	\$395.89M	\$393.89M
Cumulative Contribution	\$0.00M	\$0.00M	\$0.00M	\$0.00M

\* 2010 NACUBO-Commonfund Study of Endowments (NCSE).

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation.

# Asset Allocation Detail

	Policy	NCSE Peers* \$101-500 Million	Diverse (80/20)	Diverse (70/30)
<b>Equity Strategies</b>				
<b>Traditional Strategies</b>				
Domestic Large Cap Equity	60.0%	7.3%	15.0%	10.0%
Domestic All Cap Equity	0.0%	18.7%	20.0%	15.0%
Domestic Small Cap Equity	0.0%	0.0%	0.0%	0.0%
REITS	0.0%	0.0%	0.0%	0.0%
Developed International Equity	0.0%	13.4%	8.0%	8.0%
Emerging Markets Equity	0.0%	3.6%	7.0%	7.0%
<b>Non-Marketable Strategies</b>				
Private Equity	0.0%	5.6%	5.0%	5.0%
Venture Capital	0.0%	1.7%	5.0%	5.0%
Distressed Debt	0.0%	1.7%	5.0%	5.0%
Total Equity Strategies	60.0%	51.9%	65.0%	55.0%
<b>Fixed Income Strategies</b>				
<b>Traditional Strategies</b>				
3-Month US Government Bill (Cash)	5.0%	7.0%	1.0%	1.0%
2-Year US Government Note	0.0%	0.0%	0.0%	0.0%
10-Year US Government Note	0.0%	0.0%	0.0%	0.0%
Core Bonds	35.0%	14.6%	9.0%	9.0%
Global Bonds	0.0%	1.5%	0.0%	0.0%
Emerging Markets Debt	0.0%	0.0%	0.0%	0.0%
High Yield Debt	0.0%	0.9%	0.0%	0.0%
Total Fixed Income Strategies	40.0%	24.0%	10.0%	10.0%
<b>Directional/Relative Value Strategies</b>				
Directional Hedge	0.0%	10.7%	5.0%	5.0%
Relative Value	0.0%	7.1%	0.0%	10.0%
Total Directional/Relative Value Strategies	0.0%	17.8%	5.0%	15.0%
<b>Real Assets</b>				
TIPs	0.0%	0.0%	0.0%	0.0%
Commodities	0.0%	4.0%	5.0%	5.0%
Natural Resources	0.0%	0.0%	5.0%	5.0%
Private Real Estate	0.0%	2.3%	10.0%	10.0%
Total Real Assets	0.0%	6.3%	20.0%	20.0%
TOTAL	100.0%	100.0%	100.0%	100.0%
Total Equity/Fixed Mix	60% / 40%	67% / 33%	80% / 20%	70% / 30%

\* 2010 NACUBO-Commonfund Study of Endowments (NCSE).

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# Summary Results (HEPI)

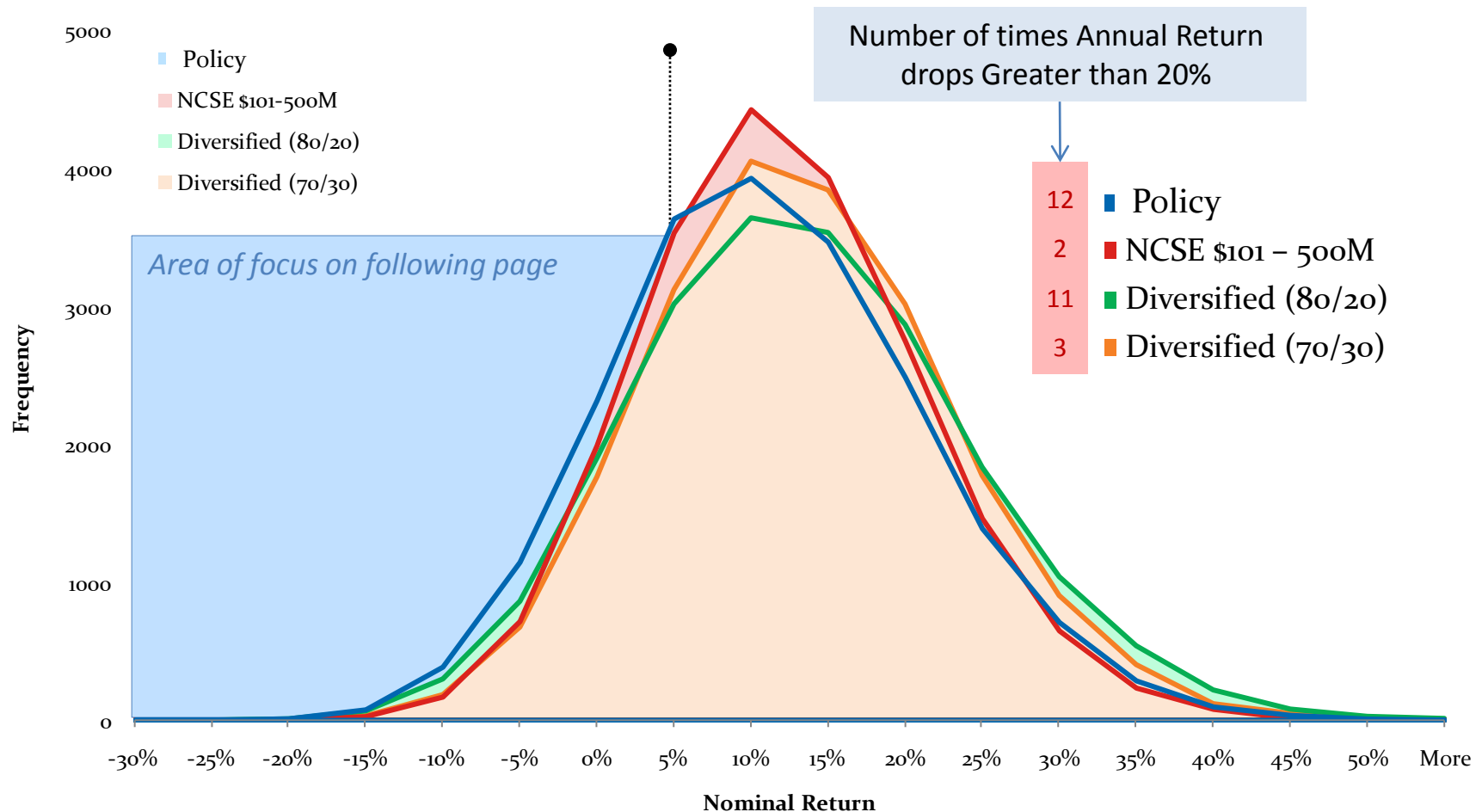
Projected Annualized	Policy	NCSE Peers* \$101-500 Million	Diverse (80/20)	Diverse (70/30)
<b>Performance (20 years)</b>				
Median Total Return - Nominal	8.1%	9.0%	10.3%	10.2%
Standard Deviation - Nominal	10.0%	9.0%	10.7%	9.7%
Median Total Return - Real (HEPI)	3.9%	4.9%	6.0%	6.0%
Standard Deviation - Real (HEPI)	9.8%	8.8%	10.5%	9.5%
Div & Income	4.8%	4.8%	4.8%	4.8%
<b>Intergenerational Equity (HEPI)</b>	<b>27.7%</b>	<b>45.6%</b>	<b>64.9%</b>	<b>66.6%</b>
% Negative Spending	30.9%	23.1%	20.6%	18.4%
<b>Market Beta</b>				
S&P 500	0.62	0.51	0.61	0.53
Barclays Aggregate Bond	0.68	0.34	0.21	0.16
Inflation (HEPI)	0.10	0.21	0.13	0.19
<b>Sharpe Ratio</b>	<b>0.11</b>	<b>0.16</b>	<b>0.17</b>	<b>0.18</b>
<b>Expected Shortfall</b>				
Monthly Value at Risk (VaR)	-3.7%	-3.2%	-3.8%	-3.3%
Monthly Conditional Value at Risk (CVaR)	-4.8%	-4.2%	-4.9%	-4.4%
<b>Other Characteristics</b>				
Sortino	0.21	0.30	0.32	0.35
Calmar	0.20	0.24	0.24	0.28
Up Capture	0.99	0.82	0.83	0.83
Down Capture	0.99	0.65	0.64	0.59
Max Drawdown (%)	0.40	0.38	0.43	0.37
Average Recovery Time (mo.s)	84	70	69	57
<b>Direct Non-\$ Exposure</b>	<b>0.0%</b>	<b>28.1%</b>	<b>23.0%</b>	<b>27.0%</b>

\* 2010 NACUBO-Commonfund Study of Endowments (NCSE), The "University of Chinook" is hypothetical.

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation.

# Nominal Return Distribution

*Distribution of 20,000 Annual Returns over 20 years, 1,000 scenarios*

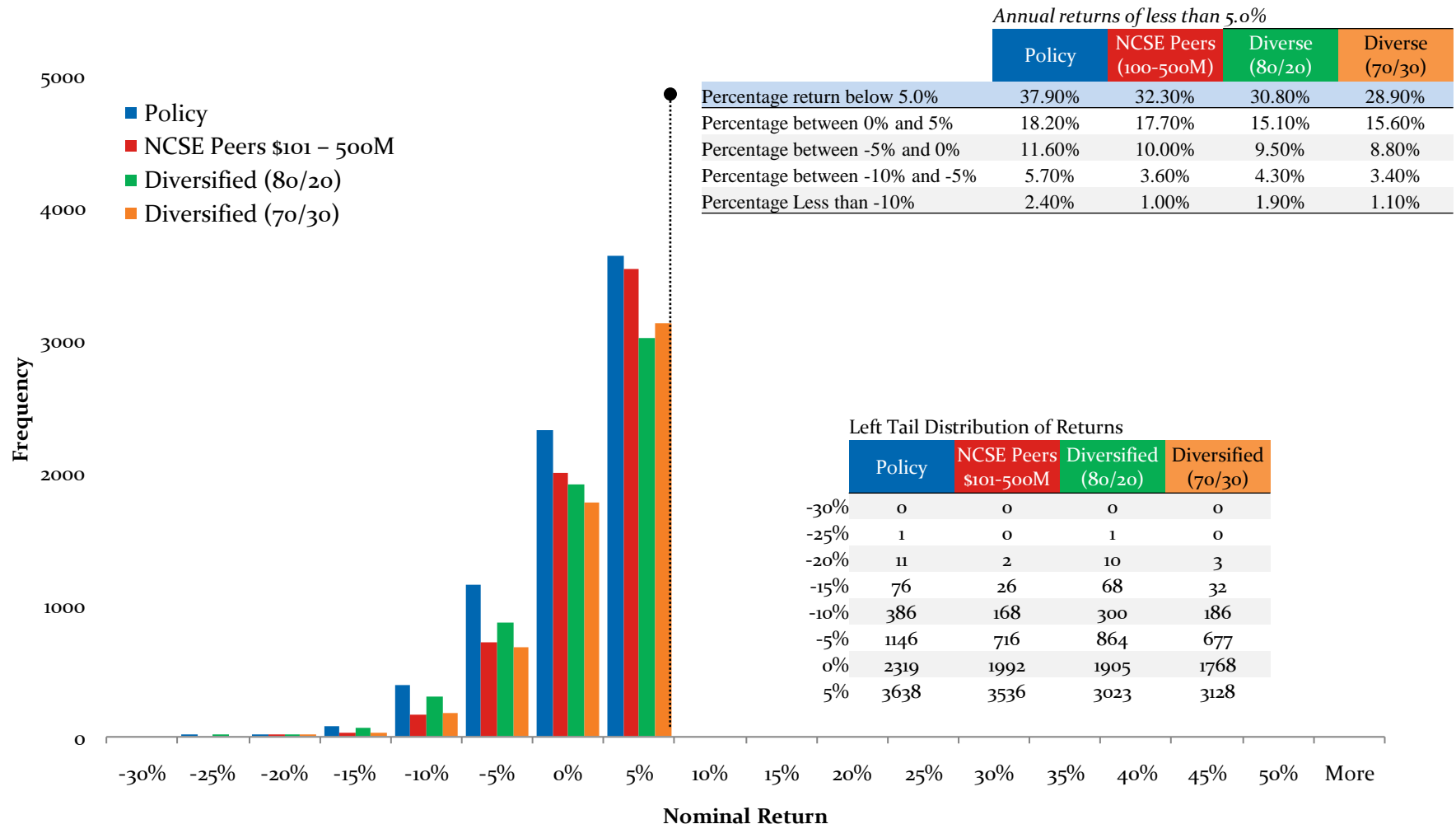


2010 NACUBO-Commonfund Study of Endowments (NCSE).

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation.

# Nominal Return Distribution | Where Return is Less than 5%

*Distribution of a subset\* of the 20,000 Annual Returns over 20 years, 1,000 scenarios*



See table "Annual Return is Less Than 5.0%" to determine the number of occurrences in distribution.

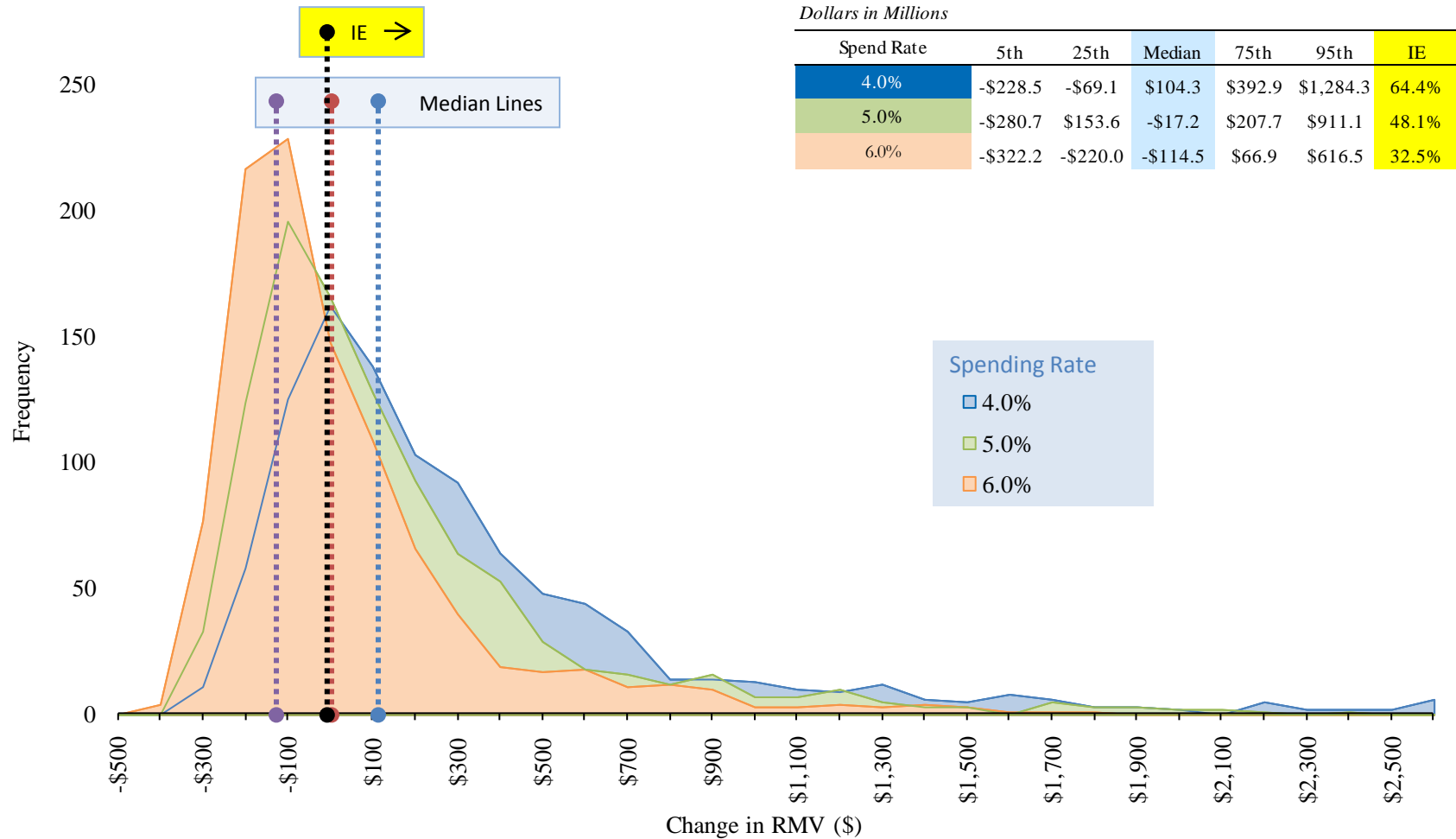
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# Impact of a Change in Spending Rate

## Method – Year End Value | HEPI

### 20 Years | Assets of \$250 Million



Distributions illustrated in chart are generated utilizing the Commonfund Allocation Planning Model™

IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results and are not guarantees of future results. See APM notes at the end of this presentation.



# Liquidity Environments | Stress Test

		Environment Types				
		Normal	Difficult (10-year event)		Stress (50-year event)	
Asset Classes	Allocation	V%	V 1%	V2%	V1%	V2%
Money market - other		D100%	D100%		D50%	Q50%
T-Bills		D100%	D100%		D100%	
U.S.   Large cap	20%	D100%	D100%		D50%	M50%
U.S.   Mid cap	15%	D100%	D100%		D25%	M75%
U.S.   Small cap		D100%	D50%	M50%		M100%
Int'l   Large cap	13%	D100%	D100%		D50%	M50%
Int'l   Mid/small cap		D100%	D50%	M50%		M100%
Int'l   Emerging markets	5%	M100%	M100%		Q100%	
Treasuries		D100%	D100%		D100%	
Bonds   Core	12%	D100%	D100%		D50%	Q50%
Bonds   Emerging market		M100%		Q100%	Q50%	I50%
Commodities	5%	D100%	D100%		D50%	Q50%
High yield		D100%	D50%	M50%		Q100%
Distressed debt	3%	I100%	I100%		I100%	
Hedge   Long/short	9%	Q100%	Q50%	Y50%	Y50%	I50%
Hedge   Relative value	5%	Y100%	Y100%		Y50%	I50%
Venture		I100%	I100%		I100%	
Private equity	5%	I100%	I100%		I100%	
Private real estate	5%	I100%	I100%		I100%	
Natural Resources	3%	I100%	I100%		I100%	
<b>Total</b>	<b>100%</b>					

## Key

D = Daily

M = Monthly

Q = Quarterly

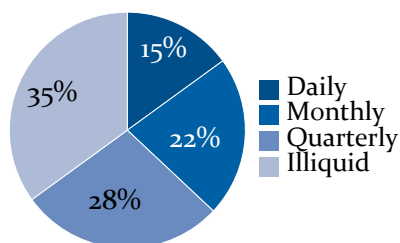
Y = > Year

I = Illiquid

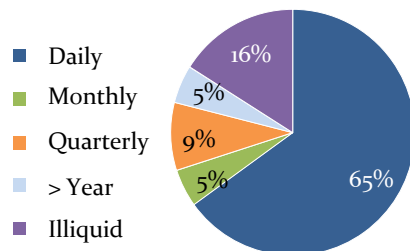
V = Liquidity Value

Liquidity Value	Normal	Difficult	Stress
Daily	65%	65.0%	28.8%
Monthly	5%	5.0%	27.8%
Quarterly	9%	4.5%	13.5%
> Year	5%	9.5%	7.0%
Illiquid	16%	16.0%	23.0%
	100%	100%	100%

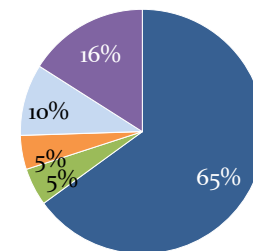
## Liquidity Policy



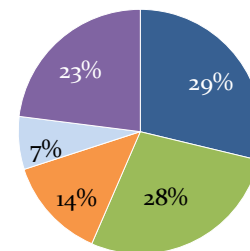
## Normal Environment



## Difficult Environment



## Stress Environment



# Market Correlations

*10 years ending 12/31/09*

	Correlation to SPX 10 years	Beta to SPX 10 years
MSCI EAFE (Local)	0.88	0.86
MSCI EM Free (Local)	0.77	0.99
Commodities Dow Jones – UBS	0.29	0.32
Russell 2000	0.80	1.07
MSCI ACW X US (Local)	0.89	0.86
WGBI	0.06	0.03
Barclays Capital U.S. Aggregate	-0.01	0.00
HFRI RV MIX	0.66	0.20
HFRI Hedged Equity	0.74	0.42
Wilshire Real Estate Index	0.60	0.96
NACREIF <sup>(1)</sup>	0.13	0.03
50/50 Venture Capital/ Private Equity	0.42	0.21
Natural Resources	0.28	0.18

Source: Bloomberg, ThompsonOne.com, HFRI, NACREIF, Commonfund Capital, Inc. (Natural Resources)

# Sample Portfolio | Risk Analysis

Fund Category	Benchmark	Target						Reduced Risk					
		Target Market Value	Portfolio VaR (bps)	CVaR (bps)	Contribution To Total Risk	Contribution To Total Risk*	Relative VaR (bps)	Target Market Value	Portfolio VaR (bps)	CVaR (bps)	Contribution To Total Risk	Contribution To Total Risk*	Relative VaR (bps)
<b>Total Portfolio</b>	<b>**</b>	<b>\$</b>	<b>(407.8)</b>	<b>(512.9)</b>	<b>100%</b>	<b>81,729,000</b>	<b>(155.4)</b>		<b>(348.2)</b>	<b>(440.8)</b>	<b>100%</b>	<b>81,729,000</b>	<b>(148.7)</b>
<b>EQUITY</b>		<b>\$</b>	<b>(623.6)</b>	<b>(784.9)</b>	<b>71.9%</b>	<b>58,139,574</b>	<b>(109.5)</b>		<b>(626.3)</b>	<b>(786.1)</b>	<b>64.2%</b>	<b>51,982,086</b>	<b>(108.6)</b>
All Cap Equity Fund / Eq Opps	Russell 3000 Index	\$	(689.7)	(864.1)	32.3%	26,157,035	(124.3)		(689.7)	(864.1)	26.1%	21,125,721	(124.3)
Multistrategy Equity	S&P 500 Index	\$	(581.2)	(742.6)	20.2%	16,377,834	(162.6)		(581.2)	(742.6)	14.9%	12,031,694	(162.6)
International Equity	MSCI World Ex-US Net	\$	(623.0)	(787.1)	9.2%	7,410,591	(219.6)		(623.0)	(787.1)	11.2%	9,022,204	(219.6)
Emerging Markets	MSCI EM Free Net	\$	(807.8)	(993.7)	10.1%	8,194,114	(188.2)		(807.8)	(993.7)	12.1%	9,802,466	(188.2)
<b>FIXED INCOME AND COMMODITIES</b>		<b>\$</b>	<b>(239.9)</b>	<b>(289.7)</b>	<b>6.6%</b>	<b>5,336,081</b>	<b>(80.4)</b>		<b>(191.6)</b>	<b>(243.5)</b>	<b>9.8%</b>	<b>7,956,917</b>	<b>(66.5)</b>
Multistrategy Bond	Barclays Aggregate Index	\$	(181.0)	(241.0)	-0.4%	(315,997)	(58.1)		(181.0)	(241.0)	1.0%	833,982	(58.1)
Multistrategy Commodities	DJ UBS Commodity Index	\$	(790.6)	(968.2)	6.6%	5,299,875	(161.8)		(790.6)	(968.2)	8.2%	6,594,611	(161.8)
Distressed	CSFB Leveraged Loan Index	\$	(150.8)	(213.0)	0.4%	352,203	(196.0)		(150.8)	(213.0)	0.7%	528,324	(196.0)
<b>MARKETABLE ALTERNATIVES</b>		<b>\$</b>	<b>(342.8)</b>	<b>(428.2)</b>	<b>3.8%</b>	<b>3,104,245</b>	<b>(421.9)</b>		<b>(342.8)</b>	<b>(428.2)</b>	<b>4.4%</b>	<b>3,594,605</b>	<b>(421.9)</b>
Hedged Investors	S&P 500 Index	\$	(342.7)	(428.1)	3.8%	3,104,245	(421.9)		(342.7)	(428.1)	4.4%	3,594,605	(421.9)
<b>REAL ESTATE</b>		<b>\$</b>	<b>(893.3)</b>	<b>(1,155.5)</b>	<b>2.0%</b>	<b>1,625,334</b>	<b>(699.1)</b>		<b>(893.3)</b>	<b>(1,155.5)</b>	<b>3.7%</b>	<b>2,967,533</b>	<b>(699.1)</b>
Real Estate	NECREIF	\$	(893.3)	(1,155.5)	2.0%	1,625,334	(699.1)		(893.3)	(1,155.5)	3.7%	2,967,533	(699.1)
<b>PRIVATE EQUITY</b>	<b>VE - US Venture Index</b>	<b>\$</b>	<b>(528.0)</b>	<b>(647.2)</b>	<b>15.7%</b>	<b>12,706,476</b>	<b>(628.9)</b>		<b>(528.0)</b>	<b>(647.2)</b>	<b>17.8%</b>	<b>14,410,570</b>	<b>(628.9)</b>
Global ex US PE	MSCI EAFE Index	\$	(705.5)	(862.8)	3.8%	3,053,523	(633.9)		(705.5)	(862.8)	4.4%	3,530,984	(633.9)
Natural Resources	S&P GSCI Total Return	\$	(679.3)	(857.5)	3.2%	2,608,692	(1,138.7)		(679.3)	(857.5)	3.5%	2,865,656	(1,138.7)
US PE	Bloomberg IPO Index	\$	(483.6)	(597.3)	2.6%	2,078,813	(665.0)		(483.6)	(597.3)	2.9%	2,309,612	(665.0)
Venture PE	Bloomberg IPO Index	\$	(991.0)	(1,196.5)	6.1%	4,965,448	(480.0)		(991.0)	(1,196.5)	7.1%	5,704,317	(480.0)
<b>OTHER</b>		<b>\$</b>	<b>N/A</b>						<b>N/A</b>				
Cash	N/A	\$	N/A						N/A				

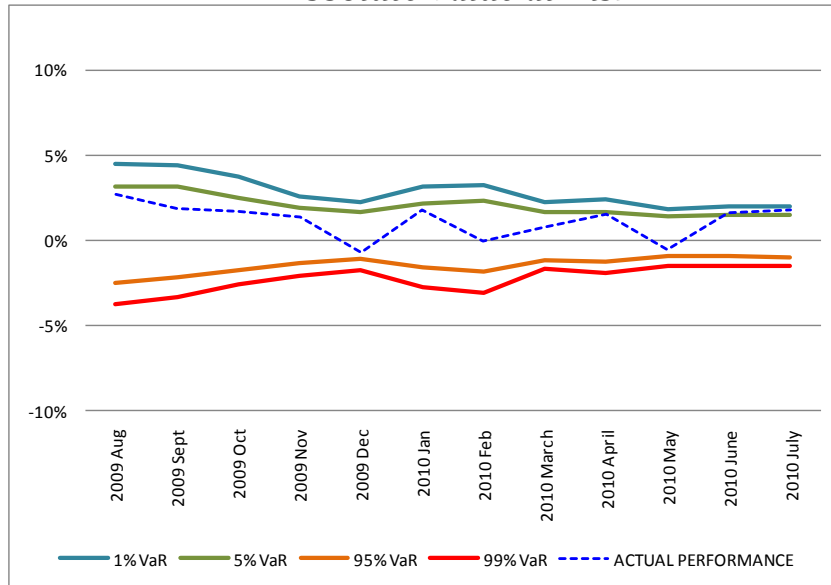
# Sample Portfolios | Relative Scenario & Stress Analysis

RELATIVE	TARGET						REDUCED RISK					
	Equity	Fixed Income	Alts	Real Estate	Private Capital	Total	Equity	Fixed Income	Alts	Real Estate	Private Capital	Total
Asian Flu P/L %	(2.10%)	0.63%	(4.73%)	1.63%	(21.21%)	(4.23%)	(1.87%)	0.41%	(4.73%)	1.63%	(21.21%)	(3.92%)
Bond Market Crash P/L %	4.02%	(1.92%)	3.41%	(6.56%)	3.54%	1.71%	4.46%	(1.30%)	3.41%	(6.56%)	3.54%	1.47%
Bond Market Rally P/L %	2.53%	2.19%	(22.37%)	8.65%	(50.28%)	(6.18%)	4.04%	2.31%	(22.37%)	8.65%	(50.28%)	(5.57%)
Bond Sell Off 2004 P/L %	0.19%	(0.68%)	(2.75%)	(4.27%)	0.03%	(0.60%)	0.27%	(0.60%)	(2.75%)	(4.27%)	0.03%	(0.63%)
Crash of 87 P/L %	3.78%	(0.49%)	18.24%	(1.00%)	5.78%	3.51%	3.36%	(0.47%)	18.24%	(1.00%)	5.78%	2.91%
Credit Crunch 2002 P/L %	3.26%	0.52%	14.56%	5.04%	8.59%	4.29%	3.14%	0.32%	14.56%	5.04%	8.59%	3.91%
Credit Scare 2004 P/L %	0.35%	(1.24%)	1.24%	(3.23%)	4.74%	0.39%	0.48%	(1.00%)	1.24%	(3.23%)	4.74%	0.36%
Credit Seize 2008 P/L %	2.18%	3.30%	23.17%	8.71%	22.67%	7.22%	2.35%	0.75%	23.17%	8.71%	22.67%	6.66%
Dead Bear Bounce P/L %	(0.50%)	0.20%	(3.60%)	(1.22%)	(6.44%)	(1.50%)	(0.54%)	0.18%	(3.60%)	(1.22%)	(6.44%)	(1.44%)
Dot Bomb P/L %	(1.50%)	0.81%	9.15%	3.33%	30.44%	4.81%	(1.83%)	0.39%	9.15%	3.33%	30.44%	4.79%
Dot Com Hangover 02 P/L %	4.33%	0.71%	18.41%	6.48%	3.45%	4.43%	4.13%	0.73%	18.41%	6.48%	3.45%	3.99%
Emerging Markets Rally P/L %	2.39%	(0.74%)	(2.26%)	(2.58%)	(26.15%)	(3.27%)	2.39%	(0.44%)	(2.26%)	(2.58%)	(26.15%)	(3.50%)
Equity Meltdown 2002 P/L %	3.43%	0.45%	10.50%	1.91%	0.97%	2.69%	3.29%	0.67%	10.50%	1.91%	0.97%	2.40%
Equity Markets Correction W2001 P/L %	(0.53%)	(0.14%)	7.88%	0.19%	26.64%	4.16%	(0.62%)	(0.29%)	7.88%	0.19%	26.64%	4.12%
Equity Markets Rally S2001 P/L %	0.13%	0.21%	(12.25%)	(1.21%)	(30.62%)	(5.27%)	0.23%	0.11%	(12.25%)	(1.21%)	(30.62%)	(5.26%)
ERM Crisis P/L %	8.27%	0.45%	(0.67%)	2.07%	(8.23%)	3.19%	9.83%	0.27%	(0.67%)	2.07%	(8.23%)	2.98%
Fed Tightening P/L %	1.31%	(0.71%)	0.82%	(2.85%)	(3.83%)	(0.30%)	1.18%	(0.67%)	0.82%	(2.85%)	(3.83%)	(0.54%)
Flat Tax 95 P/L %	(1.13%)	0.70%	(6.90%)	3.15%	(11.13%)	(2.15%)	(1.15%)	0.52%	(6.90%)	3.15%	(11.13%)	(2.03%)
Gulf War P/L %	0.57%	(1.59%)	10.80%	(0.37%)	16.00%	2.91%	0.46%	(0.97%)	10.80%	(0.37%)	16.00%	2.83%
High Octane June 2008 P/L %	(0.29%)	0.42%	3.80%	(0.29%)	6.79%	1.12%	(0.35%)	0.21%	3.80%	(0.29%)	6.79%	1.11%
IR Steepening P/L %	0.16%	1.49%	(4.66%)	(0.97%)	(10.09%)	(1.49%)	0.26%	0.77%	(4.66%)	(0.97%)	(10.09%)	(1.53%)
Jan UoH Eight P/L %	1.17%	0.59%	7.45%	3.88%	7.13%	2.55%	1.18%	0.33%	7.45%	3.88%	7.13%	2.42%
Japan Market Crash 97 P/L %	(4.23%)	0.58%	(9.31%)	1.94%	(20.40%)	(5.39%)	(3.78%)	0.06%	(9.31%)	1.94%	(20.40%)	(4.87%)
Lehman Fail Post Bail P/L %	1.92%	(0.69%)	18.02%	4.64%	11.50%	3.96%	2.09%	(1.37%)	18.02%	4.64%	11.50%	3.56%
Lehman Fail Pre Bail P/L %	2.30%	(1.10%)	12.21%	(2.27%)	10.32%	2.90%	2.38%	(1.32%)	12.21%	(2.27%)	10.32%	2.52%
May-June 2006 Sell Off P/L %	(0.78%)	(0.98%)	1.61%	0.41%	5.02%	0.30%	(0.55%)	(0.83%)	1.61%	0.41%	5.02%	0.42%
MKTS down IR down W2001 P/L %	(0.25%)	0.59%	6.86%	1.85%	21.46%	3.77%	(0.37%)	0.29%	6.86%	1.85%	21.46%	3.72%
MKTS down IR up S2000 P/L %	(1.39%)	(0.60%)	0.89%	(1.47%)	22.98%	2.56%	(1.24%)	(0.62%)	0.89%	(1.47%)	22.98%	2.69%
MKTS down IR up S1999 P/L %	0.77%	(0.22%)	5.05%	(1.89%)	15.27%	2.72%	0.67%	(0.19%)	5.05%	(1.89%)	15.27%	2.60%
MKTS up IR down W2000 P/L %	(0.48%)	(0.12%)	(4.57%)	0.69%	(2.64%)	(0.83%)	(0.43%)	(0.02%)	(4.57%)	0.69%	(2.64%)	(0.74%)
MKTS up IR up W1999 P/L %	2.91%	(0.04%)	(13.75%)	(4.11%)	(30.10%)	(4.21%)	3.49%	(0.19%)	(13.75%)	(4.11%)	(30.10%)	(4.32%)
Nasdaq 25percent Correction P/L %	1.37%	(0.91%)	10.05%	0.89%	15.52%	3.46%	1.47%	(0.91%)	10.05%	0.89%	15.52%	3.28%
Nasdaq 25 percent Rally P/L %	3.87%	(0.87%)	3.31%	(1.35%)	(25.14%)	(1.99%)	3.79%	(0.51%)	3.31%	(1.35%)	(25.14%)	(2.39%)
No Deflation Sell Off 03 P/L %	1.29%	(0.83%)	(0.01%)	(5.48%)	(2.72%)	(0.48%)	1.32%	(0.71%)	(0.01%)	(5.48%)	(2.72%)	(0.64%)
Post No Deflation Sell 2003 P/L %	(0.14%)	0.38%	3.27%	3.16%	(8.08%)	(0.74%)	(0.30%)	0.47%	3.27%	3.16%	(8.08%)	(0.72%)
Rally From Bear Markets 2002 P/L %	(2.96%)	0.29%	(12.45%)	(1.38%)	(9.40%)	(3.63%)	(2.74%)	0.21%	(12.45%)	(1.38%)	(9.40%)	(3.24%)
Russian Debt Crisis P/L %	0.47%	(0.05%)	6.26%	1.15%	20.64%	3.79%	0.67%	(0.30%)	6.26%	1.15%	20.64%	3.74%
September 11th P/L %	0.11%	(0.09%)	3.69%	0.42%	1.80%	0.54%	0.11%	(0.24%)	3.69%	0.42%	1.80%	0.48%
September 11 Crash P/L %	0.56%	1.02%	0.10%	3.31%	(10.04%)	(0.71%)	0.48%	0.48%	0.10%	3.31%	(10.04%)	(0.84%)
Shanghai Surprise P/L %	0.48%	(0.13%)	1.94%	0.39%	1.83%	0.63%	0.49%	(0.11%)	1.94%	0.39%	1.83%	0.58%
Summer 2007 Crisis P/L %	0.36%	(0.82%)	3.10%	1.17%	8.92%	1.65%	0.54%	(0.83%)	3.10%	1.17%	8.92%	1.60%

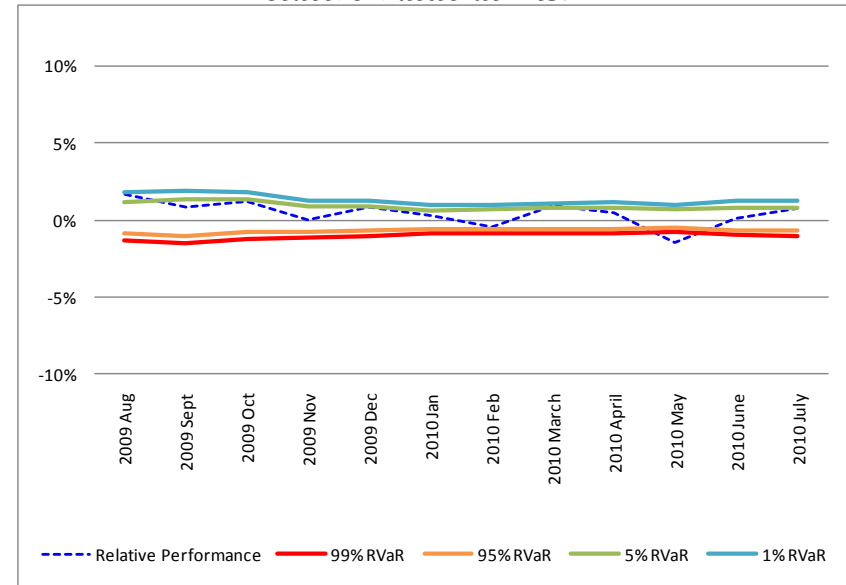
# Managing Exposure to Unexpected Volatility

## *Hypothetical Fund - Absolute and Relative Value at Risk*

*Absolute Value at Risk*



*Relative Value at Risk*



	2009 Aug	2009 Sept	2009 Oct	2009 Nov	2009 Dec	2010 Jan	2010 Feb	2010 March	2010 April	2010 May	2010 June	2010 July
<b>Actual Performance</b>	<b>2.7%</b>	<b>1.9%</b>	<b>1.7%</b>	<b>1.3%</b>	<b>-0.7%</b>	<b>1.8%</b>	<b>-0.1%</b>	<b>0.8%</b>	<b>1.6%</b>	<b>-0.6%</b>	<b>1.6%</b>	<b>1.8%</b>
1% VaR	4.5%	4.4%	3.7%	2.5%	2.3%	3.2%	3.3%	2.3%	2.5%	1.9%	2.0%	2.0%
5% VaR	3.2%	3.1%	2.5%	1.9%	1.6%	2.2%	2.3%	1.7%	1.7%	1.4%	1.5%	1.5%
95% VaR	-2.5%	-2.2%	-1.8%	-1.3%	-1.1%	-1.6%	-1.8%	-1.1%	-1.2%	-0.9%	-0.9%	-1.0%
99% VaR	-3.7%	-3.4%	-2.6%	-2.1%	-1.7%	-2.7%	-3.0%	-1.7%	-1.9%	-1.5%	-1.5%	-1.5%
Overperform 5%	no	no	no	no	no	no	no	no	no	no	yes	yes
Underperform 95%	no	no	no	no	no	no	no	no	no	no	no	no

	2009 Aug	2009 Sept	2009 Oct	2009 Nov	2009 Dec	2010 Jan	2010 Feb	2010 March	2010 April	2010 May	2010 June	2010 July
<b>Relative Performance</b>	<b>1.7%</b>	<b>0.8%</b>	<b>1.2%</b>	<b>0.0%</b>	<b>0.8%</b>	<b>0.3%</b>	<b>-0.4%</b>	<b>0.9%</b>	<b>0.5%</b>	<b>-1.4%</b>	<b>0.1%</b>	<b>0.7%</b>
1% RVaR	1.8%	1.9%	1.9%	1.3%	1.3%	1.0%	1.0%	1.1%	1.2%	1.0%	1.2%	1.3%
5% RVaR	1.2%	1.4%	1.3%	0.9%	0.9%	0.6%	0.7%	0.8%	0.8%	0.7%	0.9%	0.8%
95% RVaR	-0.9%	-1.0%	-0.8%	-0.7%	-0.7%	-0.5%	-0.6%	-0.6%	-0.6%	-0.5%	-0.7%	-0.7%
99% RVaR	-1.3%	-1.5%	-1.2%	-1.1%	-1.1%	-0.8%	-0.9%	-0.9%	-0.9%	-0.8%	-1.0%	-1.0%
Overperform 5%	yes	no	no	no	no	no	no	yes	no	no	no	no
Underperform 95%	no	no	no	no	no	no	no	no	no	yes	no	no

Max Relative Stress	2002 Equity Meltdown	2002 Equity Meltdown	98 Russian Debt Crisis	98 Russian Debt Crisis	98 Russian Debt Crisis	2002 Equity Meltdown	CreditSeize08	CreditSeize08	CreditSeize08	CreditSeize08	CreditSeize08	CreditSeize08
Max Relative Stress P/L %	-2.25%	-1.89%	-2.20%	-0.50%	-2.39%	-1.99%	-5.17%	-5.31%	-10.69%	-9.18%	-10.17%	-5.24%

# Setting Risk Appetite

## Setting Risk Appetite

- ❑ What is the likelihood that you will create intergenerational equity?
- ❑ What is your institution's tolerance for investment volatility?:
  - Normal Markets
  - Stress Markets
- ❑ What is your maximum downside risk tolerance?
- ❑ How do you set your liquidity policy?:
  - Normal Markets
  - Stress Markets
- ❑ What is your process for monitoring risk-adjusted performance versus investment policy guidelines?
  - How will you capture and mitigate exposure to unexpected volatility?

# Sample Portfolio | Draft Policy Portfolio Risk Tolerance

## Risk Policy

### Risk Guidelines

- Probability of Achieving Intergenerational Equity - HEPI (20 years)
  - Greater than 65% probability
- Maximum Cumulative Drawdown (Absolute Peak to Trough)
  - < 50% Drawdown
- Worst Case Historical Stress on Aggregate Portfolio
  - VaR: 40% / RVaR: 10%
- Value at Risk for the Aggregate Portfolio
  - 400 basis points per month (95% confidence)
- Relative Value at Risk for the Aggregate Portfolio
  - 150 basis points per month (95% confidence)

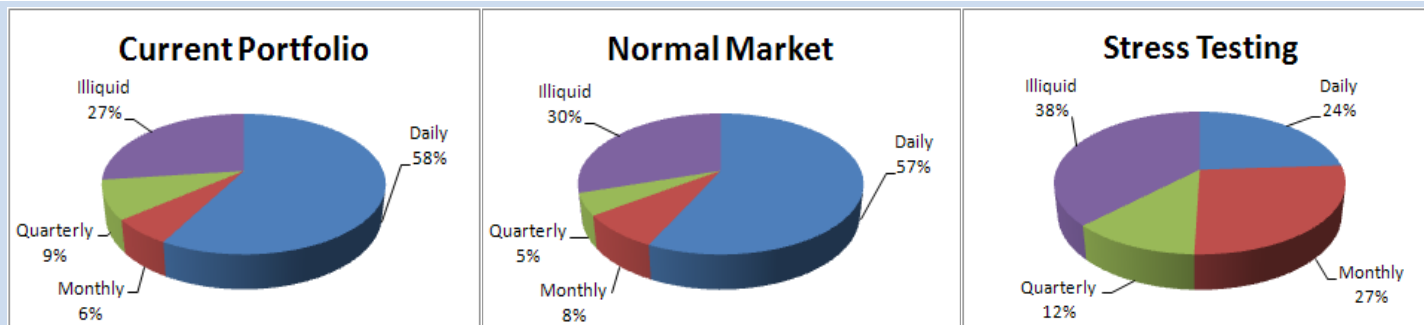
### Downside Risk Tolerance

- |                                    | Net        | Nominal   |
|------------------------------------|------------|-----------|
| • Bottom 5th %                     | (-\$77.5M) | +\$135.1M |
| • Bottom 25th %                    | +26.5M     | +208.3M   |
| • Percentage Nominal Returns < 5%: |            | 30.9%     |
- Net = Portfolio return net of spending, contributions and inflation (HEPI).
  - Nominal = Nominal portfolio return without considering spending, contributions or inflation.

## Liquidity Policy

### Liquidity Mix

- Daily > 20%
- Monthly > 25%
- Quarterly < 25%
- Illiquid < 40%



## Current Risk Metrics

Aggregate Portfolio includes all asset classes.

VaR / RVaR risk metrics are 12 month average except:

- \* 1 month
- \*\* 6 month

Worst Case Stress over last 12 months.

Monthly Risk Guidelines	YaR 12 Month Average %	Worst Case YaR Stress %	RVaR 12 Month Average %	Worst Case RVaR Stress %
<b>Aggregate Portfolio*</b>	-4.08	-32.95	-1.55	-6.18
<b>Liquid Asset Classes</b>				
Equity Opportunities	-11.43	-52.70	-2.30	-4.50
Multi-Strategy Equity	-9.16	-47.70	-2.81	-9.00
International Equity	-10.37	-52.95	-1.95	-4.51
Emerging Market Equity	-10.64	-59.33	-2.75	-5.15
Multi-Strategy Bond	-1.99	-18.40	-0.97	-10.20
Multi-Strategy Commodity	-10.08	-41.28	-2.59	-10.31
Hedged Investors**	-3.24	-26.47	-4.48	--



## Risk Management | Summary

# Risk Management Summary

- ❑ Build a risk framework defined by culture and driven by execution
- ❑ Set your risk appetite
- ❑ Assess, monitor and manage risk holistically
  - ❑ Assets and liabilities
  - ❑ Aggregate Investment Portfolio
  - ❑ Assesses risk and return
  - ❑ Liquidity vs. Illiquidity
  - ❑ Normal Markets vs Stress Markets
  - ❑ Forward looking
- ❑ Cover all risk factors
  - ❑ Financial risk
  - ❑ Investment risk
  - ❑ Liquidity risk
  - ❑ Counterparty risk
  - ❑ Operational risk
- ❑ Support your investment committee's decision-making process
  - ❑ Target Portfolio & Asset Allocation vs Risk Appetite
  - ❑ Stress Liquidity vs Stress Liquidity Mix
  - ❑ Create intergenerational equity

# Appendix

# Commonfund Allocation Planning Model™

- IMPORTANT: The projections or other information generated by the APM regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investments and are not guarantees of future results.
- A financial forecasting tool that, based on the regression of historical data, simulates future economic scenarios and asset class returns within those economic scenarios.
- Term Structure model that uses Monte Carlo simulation to project future yield curves (economic environments) for up to 20 years.
- Model calculates asset class results relative to the projected yield curves
- Starting point of the simulations is the US yield curve as of December 31 2008
  - 30 Day T- Bill 0.01%
  - 1yr BBB Corp Bond 5.81%
  - 10yr Tsy Note 2.214%
  - 10yr BBB Corp Bond 7.95%
- Monte Carlo simulation - changing 5 factors (inflation, Gross Domestic Product (GDP), short term and long term treasury and corporate yields) to project different possible economic scenarios
  - 1,000 scenarios for each year in a 20 year period
  - Model projects annual returns for each asset class for each year for each scenario
  - Each asset class has 20,000 projected annual returns (1,000 scenarios times 20 years)
- Model generates Total Portfolio results over 5, 10, 15, and 20 years
  - Returns (real, nominal)
  - Market values (real, nominal)
  - Spending values
- Intergenerational Equity is calculated as the state in which the nominal market value (after spending) is equal to or greater than the inflation adjusted market value (grown at CPI or HEPI). When the net market value is 0, the portfolio has maintained real purchasing power or equilibrium.
- Skewness explains to what degree, positively or negatively, the distribution median is shifted from the average.
  - Measured using Pearson's coefficient:  $3 * (\text{Mean} - \text{Median}) / \text{Standard Deviation}$

# Commonfund Allocation Planning Model™

## Commonfund's Allocation Planning Model (APM)

Commonfund's Allocation Planning Model ("APM") is a proprietary financial simulation tool that can help investors understand the expected outcomes and potential risks of an investment strategy and the interrelationships of the underlying asset classes comprising that investment strategy.

Commonfund's APM is a forward-looking, yield curve-based model that simulates potential future economic scenarios and asset class returns within those economic scenarios. The APM can therefore help investors examine portfolio choice alternatives under different conditions of economic uncertainty on a forward-looking basis.

### How does it work?

The APM is, at the core, a "term structure model." That is, the model is based on the term structure of the interest rates. We believe that the investment returns of the asset classes included in the model have been and will continue to be a function of the economic environment and in particular, changes in the yield curve. Fundamentally there are two principal processes at work in the APM: simulating the term structure and defining the asset classes in terms of their historical relationship to the factors of the term structure and the individual asset classes.

### Simulating the Term Structure:

Our model takes a starting yield curve (defined on the previous page) and uses Monte Carlo simulation to project 1,000 different yield curves each year for 20 years. This is accomplished by changing the factors that affect the curve including:

- Inflation
- Gross Domestic Product (GDP)
- 30 day U.S. T-Bill
- 10 Year U.S. Treasury Note
- 1 Year BBB Corporate Yield
- 10 Year BBB Corporate Yield

The Monte Carlo simulation that is used in the APM generates random economic conditions that change the yield curve. These changes can be aggressive and incorporate literally thousands of scenarios of low inflation - high GDP growth, low inflation - low GDP growth, high inflation - low GDP growth, etc.

However, the evolution of the yield curve in each scenario will not generate in one year drastic or "unreasonable" changes such as a change in one year from negative inflation (deflation) to hyperinflation.

### Calculating the Asset Class Returns:

The second fundamental process in the APM is generating projected asset class returns for each term structure scenario. This process begins with the selection of a representative index for each asset class. Data may go back as far as 1970 for certain indices but only as recently as 1993 for newer indices. Where no representative index exists, we have used historical data from Commonfund's experience as an investor in this particular asset class (e.g. natural resources). Each asset class' returns are then regressed against the term structure model. The regression analysis generates excess returns assumptions for each asset class relative to the term structure model. These excess returns are then used to construct a variance/covariance matrix that includes all asset classes, further defining them against the term structure model as well as to each other.

Essentially this matrix determines how the returns fit together. The covariance part of the matrix defines how asset class returns move relative to each other and the variance is the dispersion of the returns, or how far they vary relative to each other. Using the excess returns and variance/covariance matrix for the asset classes, the model is able to project how each asset class is expected to perform in each term structure scenario.

Our model takes the starting yield curve, uses Monte Carlo simulation to project 1,000 different yield curves for the next year by changing economic factors that affect the curve, and projects returns for 20 different asset classes in each of the new yield curve environments. The model then takes each of the 1,000 new yield curves as the next starting point and simulates a new yield curve, building another 1,000 yield curves for the next period, and projecting returns in those environments. In order to have the ability to focus on the long term, the model runs these simulations for twenty years into the future and therefore effectively generating 20,000 data points (returns) for each asset class.

### What can you do with it?

Commonfund's APM generates a distribution of potential outcomes simulated across thousands of different economic scenarios for given asset allocations. Every simulation describes a potential future trajectory of the economy and projects how the asset classes will perform based on the regression of historical data.

*continued on next page*

# Commonfund Allocation Planning Model™

Analyzing the distribution of thousands of returns, the model can derive statistical summaries including medians, standard deviations and percentiles for different outcomes for each asset class. With 20 year projections, we can calculate model annualized returns, medians, standard deviations, market values, and percentiles for different outcomes for entire portfolios over 5-year, 10-year, 15-year, and 20-year time periods. We are able to see the effects of compounding, in terms of both return and risk, as well as examine the “tail risk” of the distribution.

As a tool, the APM aids Commonfund in discussions with investors regarding their asset allocation decisions. It helps us think about how changing, adding, or removing an allocation to any given asset class will affect the risk-return profile of a portfolio. In addition, spending policies, gifts, and capital campaigns are important considerations in decision-making and are also incorporated into the model.

With the Commonfund APM, investors also have the ability to ask what if questions like “given a specific asset allocation and spending rate (or distribution), what is the model-generated probability of not achieving intergenerational equity or a stated investment objective over a defined period of time?” By focusing on determining how often, in terms of number of times in a random model, the nominal market value (after spending) is equal to or greater than the inflation-adjusted market value (grown at inflation only), an investor can gain valuable insight into the portfolio’s APM-generated probability of achieving intergenerational equity. By incorporating cash flows into the model like inflows from gifts and capital campaigns, and outflows from spending, distributions, or grants investors are able to understand the long-term ramifications of current asset allocation policies and cash flow situations and can gain valuable insight to help with forecasting their budgets.

## **How does the APM compare to other forecasting models?**

Ultimately, the power of a model that incorporates Monte Carlo simulation lies in the ability to produce a range of returns and generate meaningful statistical analysis from the distribution. With historical-based inputs and/or user inputs, a mean variance optimization model can only produce an efficient frontier along which reside optimal portfolios for a given expected return and standard deviation. The APM, in contrast, considers asset allocations from the user’s perspective and then generates projected returns, standard deviations, distributions, and probabilities associated with that asset allocation. With this type of analysis, the user is able to understand the likelihood of achieving goals rather than merely focusing on a median and standard deviation of an “optimal” portfolio produced by a mean variance optimization.

The APM has many advantages over mean variance optimization. In addition to generating a distribution of potential outcomes and different economic scenarios as described above (which cannot be accomplished with mean variance optimization), the APM’s term structure model has advanced features that distinguish it from most other forecasting models that use Monte Carlo simulation. The model consistently simulates the term structure of interest rates at every point in simulation time, which provides a more realistic set of the expectations that drive interest rates and a better formulation of the documented dynamic properties of inflation and interest rates.

The APM simulates four term structure components whereas other models known to incorporate term structure models simulate only one or two.

Finally, the open design architecture of the APM makes it relatively easy to update and further develop.

The APM has been designed to be a state-of-the-art investment-planning tool. Although no analytical model can completely replace informed professional judgment, the APM can provide a better foundation on which to base that judgment.

## **What are the limitations?**

No model or simulation can predict the future or account for the infinite number of

possible outcomes. The projections generated by Commonfund’s APM are based on assumptions about performance and risk characteristics of various asset classes. Those assumptions are based on historical data that are believed to be accurate and on which the APM relies. The utility of the APM depends greatly on the accuracy of that historical data and its meaningfulness in simulating future events. Commonfund cannot guarantee the accuracy of the data nor does it represent that the data will necessarily represent market conditions in the future.

The model simulates the range of probable outcomes over a 20-year time horizon of varying combinations of asset allocations, inflation expectations, spending policies, capital gifts and rebalancing rules. The reasonableness of the input assumptions made by the user will affect the reasonableness of the simulations. In all cases, the statistical confidence in the predictions falls as the simulation period gets shorter.

The results of the model will vary with any change to the inputs: asset allocation, spending rates or methods, contributions, or beginning market value. The results will also change with any periodic updates to the model starting point.

Because the model uses asset class returns, it should not be used to evaluate or simulate the results of any specific investment program (or fund).

# Commonfund Allocation Planning Model™

No APM simulation can replicate the exact experience of an institution. As such, the results of the APM should only be used as a general guide. In no way should the APM be a substitute for the important policy choices that an institution must make in developing its investment program.

The asset classes in the model are defined by index data and do not reflect the impact, either positive or negative, of active management or the fees associated with active management. Asset classes not included in the model, or other indices not used to represent the asset classes used in the model, may have characteristics similar or superior to those being analyzed.

## Key Terms

**Frequency distribution:** shows the number of observations within the ranges as defined by the horizontal axis.

**High volatility and Medium volatility hedged equity:** an investing strategy that consists of a core holding of long equities hedged at all times with short sales of stocks and/or stock index options. Depending on the mix of long and short positions the portfolio may have either a long or short bias. Not necessarily providing complete market neutrality, there will be some movement with the market.

**Low volatility hedge:** an investing strategy that typically targets some kind of absolute-return objective, without reference to any market index and emphasizes capital preservation and risk control. Examples of low volatility hedging strategies include several arbitrage strategies (convertible, fixed income and statistical) as well as event driven strategies.

**Mean variance optimization:** a quantitative asset allocation technique developed by Harry Markowitz that creates optimal portfolios using return, risk and correlation forecasts to combine assets into portfolios that maximize return for different levels of risk. A graph of all optimal portfolios is called the efficient frontier.

**Percentile:** a value on a scale of one hundred that indicates the percent of a distribution that is equal to or below it.

**Standard deviation:** a statistical measure of the degree to which an individual value in a probability distribution tends to vary from the mean of the distribution; the larger the standard deviation, the greater the degree of dispersion around the average value.

**Daily/monthly/quarterly liquidity:** investment purchases and/or redemptions may be transacted once per day, month or quarter.

**Illiquid:** investment purchases accepted at the commencement of the investment program (e.g. limited partnerships) while redemptions may be transacted only at liquidation of the investment program, typically after a number of years.

**HEPI:** Higher Education Price Index.

**CPI:** Consumer Price Index.

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Comparison of returns calculated on an IRR basis with returns on a time-weighted basis is not appropriate. For a description of the two return calculation methods see “Measuring Investment Returns, Time vs. Dollar-Weighted – What’s the Difference?”, a copy is available from Commonfund Capital.

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